

(Amended under PCT 34)

Disclosure of the Invention

Problem(s) to be Solved by the Invention

5 [0008]

However, the above-mentioned conventional broadcast receiving apparatus detects a quality of a reception state only in accordance with a bit error rate, and reduces a noise component of an audio signal only by performing a mute control in accordance  
10 with a detection result.

[0009]

As a result, although a reception state is detected with an acceptable accuracy, there has been a problem that it is difficult to perform a high quality audio playback in response to an actual  
15 reception state if merely a mute control is performed to remove a noise mixed in an audio signal.

[0010]

The present invention has been accomplished in view of the conventional problem, and it is an object of the present invention  
20 to provide an improved audio signal processing apparatus capable of performing a high quality audio playback in accordance with an audio signal received through a digital transmission system.

Means for Solving the Problem

[0011]

25 An invention recited in claim 1 is an audio signal processing apparatus for processing an audio signal outputted from receiving means which is provided for receiving a signal transmitted hereto

through a digital transmission route, said apparatus comprising:  
audio processing means for processing said audio signal; and control  
means for judging a reception state using a bit error rate and an  
AGC voltage, and controlling signal processing contents to be  
5     executed by the audio processing means in accordance with a result  
of said judging. In particular, when judging from said bit error  
rate that a reception state is not acceptable, the control means  
judges from a value of said AGC voltage whether a reception electric  
field is a weak electric field so as to judge the reception state.

10     [0012]

An invention recited in claim 13 is an audio signal processing  
method for processing an audio signal outputted from receiving means  
which is provided for receiving a signal transmitted hereto through  
a digital transmission route, said method comprising: an audio  
15     processing step for processing said audio signal; and a control  
step for judging a reception state using a plurality of information  
indicating an internal state of said receiving means, and controlling  
signal processing contents of the audio processing step in accordance  
with a result of said judging. In particular, said control step  
20     controls the signal processing contents in response to said reception  
state and a change of an amount of an audio signal outputted from  
said receiving means.

[0013]

An invention recited in claim 14 is a computer program for  
25     a computer to execute, which computer is provided for processing  
an audio signal outputted from receiving means provided for receiving  
a signal transmitted hereto through a digital transmission route,

said program comprising: an audio processing step for processing said audio signal; and a control step for judging a reception state using a plurality of information indicating an internal state of said receiving means, and controlling signal processing contents 5 of the audio processing step in accordance with a result of said judging. In particular, said control step controls the signal processing contents in response to said reception state and a change of an amount of an audio signal outputted from said receiving means.

[00014]

10 An invention recited in claim 15 is a recording medium having recorded therein a computer program for a computer to execute, which computer is provided for processing an audio signal outputted from receiving means provided for receiving a signal transmitted hereto through a digital transmission route, said program comprising: an 15 audio processing step for processing said audio signal; and a control step for judging a reception state using a plurality of information indicating an internal state of said receiving means, and controlling signal processing contents of the audio processing step in accordance with a result of said judging, and further controlling the signal 20 processing contents in response to said reception state and a change of an amount of an audio signal outputted from said receiving means.

#### Brief Description of the Drawings

[0015]

Fig. 1 provides views showing a structure and functions of 25 an audio signal processing apparatus according to an embodiment of the present invention.

Fig. 2 is a block diagram showing a structure of an audio signal

processing apparatus according to an embodiment.

Fig. 3 provides views showing a structure and functions of an audio signal amount detecting unit 6c provided in a decoding unit.

5 Fig. 4 is a block diagram showing a structure of an audio processing unit provided in the audio signal processing apparatus shown in Fig. 2.

Fig. 5 is a block diagram showing a structure of a control unit provided in the audio signal processing apparatus shown in  
10 Fig. 2.

Fig. 6 provides graphs explaining functions of a reception state aggravation period detecting unit and a reception state aggravation interval detecting unit shown in Fig. 5.

Fig. 7 provides charts schematically showing control data  
15 stored in a table shown in Fig. 5.

Fig. 8 is a flow chart explaining an operation of the audio signal processing apparatus shown in Fig. 2.

Fig. 9 is a flow chart explaining a further operation of the audio signal processing apparatus shown in Fig. 2.

20 Best Mode of Carrying Out the Invention

[0016]

Next, description will be given to explain an audio signal processing apparatus formed according to an embodiment of the present invention, with reference to Fig. 1.

25 [0017]

Fig. 1(a) is a block diagram showing a structure of an audio signal processing apparatus, Fig. 1(b) is another block diagram

showing functions of the audio signal processing apparatus.

[0018]

As shown in Fig. 1(a), the audio signal processing apparatus 1 is equipped with an audio processing unit 2 and a control unit 3. The audio processing unit 2 operates under the control of the control unit 3, to process an audio signal  $S_{AU}$  outputted from a receiving unit Rx which receives a multiplexed signal transmitted through a digital transmission route such as a digital radio broadcast, a digital television broadcast, the Internet or the like.

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Claims

1 (Amended). An audio signal processing apparatus for processing an audio signal outputted from receiving means which is provided  
5 for receiving a signal transmitted hereto through a digital transmission route, said apparatus comprising:

audio processing means for processing said audio signal; and  
control means for judging a reception state using a bit error rate and an AGC voltage, and controlling signal processing contents  
10 to be executed by the audio processing means in accordance with a result of said judging,

wherein when judging from said bit error rate that a reception state is not acceptable, the control means judges from a value of said AGC voltage whether a reception electric field is a weak electric  
15 field so as to judge the reception state.

2. The audio signal processing apparatus according to claim 1, wherein the audio processing means individually performs a signal processing on said audio signal in each channel.

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3 (Cancelled).

4 (Cancelled).

25 5 (Amended). The audio signal processing apparatus according to claim 1, wherein when the control means has judged from a value of said AGC voltage that a reception electric field is not a weak

electric field, said control means judges a reception state from a changing amount of said AGC voltage.

6. The audio signal processing apparatus according to claim 5,  
5 wherein when a changing amount of the AGC voltage is smaller than a predetermined value, the control means judges that a reception field has been stabilized, and controls said signal processing contents in response to a result of said judging.

10 7. The audio signal processing apparatus according to claim 5 or 6, wherein when a changing amount of the AGC voltage is larger than a predetermined value, the control means judges that there is not an influence from a multi-pass, and controls said signal processing contents in response to a result of said judging.

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8 (Amended). The audio signal processing apparatus according to any one of claims 1, 5 and 7, wherein when the control means has judged from a value of said AGC voltage that a reception electric field is a weak electric field, said control means judges a reception  
20 state from a changing amount of C/N value of the receiving means.

9. The audio signal processing apparatus according to claim 8, wherein when a changing amount of C/N value is smaller than a predetermined value, the control means judges that a reception electric field is a weak electric field, and controls the signal processing contents in response to a result of said judging.

10. The audio signal processing apparatus according to claim 8 or 9, wherein when a changing amount of C/N value is larger than a predetermined value, the control means judges that there is not an influence from a multi-pass, and controls the signal processing  
5 contents in response to a result of said judging.

11 (Amended). An audio signal processing apparatus for processing an audio signal outputted from receiving means which is provided for receiving a signal transmitted hereto through a digital  
10 transmission route, said apparatus comprising:

audio processing means for processing said audio signal; and  
control means for judging a reception state using a plurality of information indicating an internal state of said receiving means, and controlling signal processing contents to be executed by the  
15 audio processing means in accordance with a result of said judging,  
wherein said control means controls the signal processing contents in response to said reception state and a change of an amount of an audio signal outputted from said receiving means.

20 12. The audio signal processing apparatus according to claim 11, wherein information in relation to a change of said audio signal includes an aggravation period in which an audio signal amount is lower than a threshold and an aggravation interval which is an interval of the aggravation period.

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13 (Amended). An audio signal processing method for processing an audio signal outputted from receiving means which is provided

for receiving a signal transmitted hereto through a digital transmission route, said method comprising:

an audio processing step for processing said audio signal; and

5 a control step for judging a reception state using a plurality of information indicating an internal state of said receiving means, and controlling signal processing contents of the audio processing step in accordance with a result of said judging,

wherein said control step controls the signal processing  
10 contents in response to said reception state and a change of an amount of an audio signal outputted from said receiving means.

14 (Amended). A computer program for a computer to execute, which computer is provided for processing an audio signal outputted from  
15 receiving means provided for receiving a signal transmitted hereto through a digital transmission route, said program comprising:

an audio processing step for processing said audio signal; and

a control step for judging a reception state using a plurality  
20 of information indicating an internal state of said receiving means, and controlling signal processing contents of the audio processing step in accordance with a result of said judging,

wherein said control step controls the signal processing contents in response to said reception state and a change of an  
25 amount of an audio signal outputted from said receiving means.

15 (Amended). A recording medium having recorded therein a

computer program for a computer to execute, which computer is provided for processing an audio signal outputted from receiving means provided for receiving a signal transmitted hereto through a digital transmission route, said program comprising:

5           an audio processing step for processing said audio signal; and

              a control step for judging a reception state using a plurality of information indicating an internal state of said receiving means, and controlling signal processing contents of the audio processing  
10          step in accordance with a result of said judging, and further controlling the signal processing contents in response to said reception state and a change of an amount of an audio signal outputted from said receiving means.

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